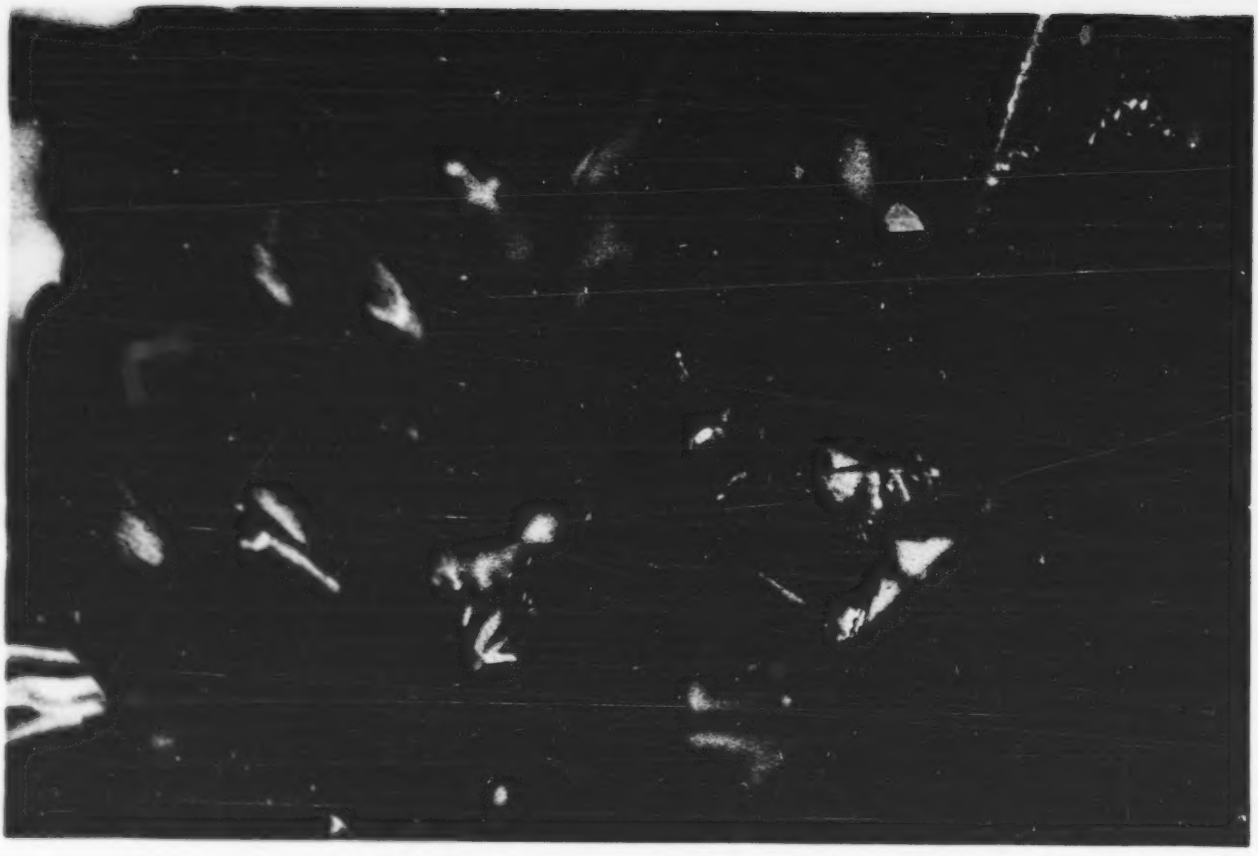

ALFALFA SEED PRODUCTION MANAGEMENT IN MANITOBA

5 years of Demonstration & Evaluation

AGRO-MAN

Government of Canada / Regional Economic Expansion
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Leafcutter Bee
Association
(Manitoba Alfalfa Seed Producers' Assoc.)

Manitoba Leafcutter Bee Association members on the Association's popular summer extension tour.

President's Message

During the five years of our Agro-Man contract, we have seen major improvements in alfalfa seed production in Manitoba.

Results from our demonstrations have been instrumental in boosting yields, leafcutter populations, acreages, and number of producers as people become aware of the potential with good crop and pollinator management.

At this time, I would like to thank those who founded our organization, those who served on the Board and those who participated in the Agro-Man project as producer cooperators. I also thank the governments of Canada and Manitoba for their financial and technical assistance.

Our association now has members province wide as a check of participants in our very well attended summer extension tours will show.

We have successfully organized and hosted the second annual Canadian Alfalfa Seed School and have developed good liason with the Saskatchewan and Alberta organizations.

In 1984, we have a new name — The Manitoba Alfalfa Seed Producers' Association — and a new set of challenges; controlling chalkbrood, finding the final answer to quackgrass control and tackling the problems of Canada thistle, sweet clover and bladder campion.

I hope that the membership will continue to join actively in identifying and attacking concerns.

Here's to equal advances in our next five years.

D. R. Greig
President
Manitoba Alfalfa Seed Producers' Association

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Introduction

In April 1979, the Manitoba Leafcutter Bee Association Inc., began a five year Canada-Manitoba Agro-Man Project designed to develop and demonstrate improved agronomic practices for alfalfa seed production in Manitoba.

The $190,000 project, cost shared jointly by the Federal Department of Regional Economic Expansion and Manitoba Agriculture, was part of an overall program to accelerate production of value added crops and to improve the efficiency of red meat production in the province.

Through producer inputs, three main areas of management were identified for activity under the Association contract. They were:

(a) insect pest identification and control
(b) weed control in seedling and established alfalfa stands
(c) fertility requirements

During the five years, over 90 on-farm demonstrations and trials were conducted with 22 farmer co-operators located in the Eastern, Western and Interlake Regions of Manitoba.

Four producer surveys were also carried out to elevate current production practices and identify problem areas where more effort was needed.

The Association had an active province wide extension program which included summer field tours, winter information meetings on alfalfa seed production, newsletters, annual project reports, farm visits and response to producer inquiries. The Association also organized and hosted the second annual Canadian Alfalfa Seed School in 1983.

Impact:

The Agro-Man Project has had a major impact on Manitoba's alfalfa seed production industry. From 1980 to 1983, total alfalfa seed acreage increased from 3,400 to 8,100 acres, a dramatic 238% increase! From 1979 to 1983, inspected pedigreed seed acreage increased by over 400% to 6,646 acres. The percentage of total acreage devoted to pedigreed rather than common seed rose from 62 to 82%.

Producer surveys also show a steady increase in the number and size of alfalfa seed operations since 1979. Much of this increase is due directly to the project.

For example, the Association's early success in improving production potential by controlling insect pests led to an influx of new producers in 1980 and 1981.

Alfalfa plant with some seed set and bloom continuing.

Existing operations also began expanding as the project demonstrated the increased returns possible through good alfalfa management.

The 1983 survey shows an average operation of 84 acres of alfalfa pollinated by 1.57 million leafcutter bees.

The surveys have also recorded production changes brought about largely by the Association's extension program. Insect control is the most noticeable. In the beginning only 5% of producers maintained an insect pest control program. In summer, 1983, the number had risen to over 90%.

There is also increased awareness of the benefit of weed control. Problem weeds have been identified, control demonstrations have given dramatically increased seed yields and herbicide use has increased.

Overall, the Agro-Man Project on alfalfa seed production has had a major, positive impact on seed production in Manitoba.

Alfalfa Seed Stand Establishment

Field Selection:

Alfalfa seed can be produced wherever conditions are good for growing and harvesting and wherever pollinators can thrive, but it does best on deep, medium textured, well drained soils. Fields which are poorly drained or subject to flooding should be avoided. Peat soils should also generally be avoided.

After soil type, probably the most important consideration in field selection is weeds. A clean field is essential since perennial weeds such as Canada Thistle, Sow Thistle and Quack Grass are difficult and expensive to control in established stands.

Fields with a history of Sweet Clover should also be avoided because the seed, which carries over in the soil, is very difficult to separate from alfalfa seed and at the time of this report, the plants can be removed safely only by hand rogueing.

Additional constraints must be considered for pedigreed seed production. For example, the field can't have been used for alfalfa production for at least two years prior to establishment of the pedigreed stand and there can be no different variety or unpedigreed alfalfa stand within 50 meters of the field.

Specific information on pedigreed production requirements is available in the Canadian Seed Growers' Association Circular No. 6-80, "Regulations and Procedures for Pedigreed Seed Crop Production."

Field Preparation and Seeding:

Since a clean field is essential for profitable alfalfa seed production, field preparation should begin well in advance of actual establishment with a weed control program designed to eliminate potential problems.

Field management could begin as much as two years before seeding with an assessment of the current weed spectrum and development of a cropping program that permits the necessary control program.

Cereals are usually preferred in the development stage, since they permit the widest range of chemical controls plus allowing time for fall weed control measures after harvesting.

At planting, the seedbed should be firm to keep seed placement relatively shallow and to aid the upward movement of soil moisture. Often, some form of packing is needed to achieve the desired firmness but on heavy soils, packing may cause soil crusting.

Growers report seeding into stubble gives the required firm seedbed plus a couple of bonuses; soil drifting is reduced and, because weed seeds aren't worked into the ground by tillage operations, annual weed problems are reduced.

Ideal seeding depth for alfalfa is 2 cm (about ½ inch). Deeper seeding reduces emergence and produces a less vigorous stand. Press drills are generally used to achieve accurate depth control. Brillion type seeders are also used but seeding depth varies considerably since they simply press the seed into the ground. Brillion seeders may also create crusting problems on heavy, wet soils and can disrupt row spacings.

Plant populations from 10,000 to 40,000 per acre produce the highest seed yields according to research in Manitoba and elsewhere. Growers have been seeding ½ to 1 pound of seed per acre (½ to 1 kg per ha) to achieve these stand densities even though the recommended rate is 2 pounds. Because the seeding rates are so low, grass seed attachments are often used. The grain drill box can also be used, but only if inert material such as cracked grain is mixed in to keep the seeding rate low.

Companion Crops:

An increasing number of alfalfa seed producers are establishing stands without companion crops for several reasons.

The alfalfa has less competition for light, moisture and nutrients; there is greater flexibility in chemical weed control and stands usually show greater winter hardiness as the plants are more vigorous and have more ability to store food reserves. Stands established without nurse crops generally have better first year seed yields and sometimes better second year yields.

Disadvantages are basically more opportunity for weeds to flourish in the thin stand and the possibility of heat stress.

Many growers continue to use companion crops for these reasons: protection against heat and soil drifting, competition against weeds and the possibility of some economic return in the establishment year.

A companion crop reduces seed yields in the first and

These are adjacent alfalfa plots, pictured at 11 months of age. The plot on the left was seeded with a cover crop. Note how much further on the plot on the right is.

possibly the second year of production. However, steps can be taken to minimize the problems.

The companion crop should be chosen carefully. Flax is the preferred choice since it provides little competition. Canola (Rapeseed) is a competitive companion crop but has been used successfully because of its early maturity. Wheat and Barley are more competitive but can usually be harvested earlier than Flax and ideally, could be harvested as greenfeed with the alfalfa free to grow rapidly in late summer and early fall. If the crops are harvested as grain, the residue should be removed promptly and carefully to prevent smothering.

Whichever companion crop is chosen, it should be seeded at half the normal rate and it should be seeded in a separate operation to permit proper seeding depth for each crop. Cross seeding also minimizes the competition.

Establishment Demonstration Results:

In all three on-farm demonstrations conducted, alfalfa stands established without companion crops produced significantly higher seed yields . . . 50 to 200 pounds per acre . . . than those established with companion crops.

The amount of yield reduction in the companion planted field depended on the type of companion crop used, its production and the environmental conditions.

Actual yield results from the demonstration trials are contained in TABLE 1 and TABLE 2.

Table 1 gives the yield results from an Algonquin field established for seed production in spring, 1979. Rapeseed, seeded at 5 pounds per acre, was used as the companion crop. The alfalfa was seeded at ½ pound per acre. The Rapeseed was combined at maturity and the alfalfa seeded with no nurse crop was cut for hay in mid-August.

The following spring (1980) was dry and alfalfa plant growth was slow, particularly in the area where the companion crop had been used. Here, the plants were much smaller, less robust and weed competition was more severe with a heavy flush of wild oats following a June rain.

Where no nurse crop was used, the alfalfa bloomed one week earlier than in the nurse crop area.

Leafcutter bees, stocked at the same rate on both areas, were used for pollination.

At harvest, the "no companion crop" area out-yielded the "companion crop" area by 98 pounds per acre!

This demonstration was monitored for a second year with the "no companion crop" area again out-yielding the "companion crop" section . . . this time by 44 pounds per acre even though there was no apparent visual difference between the plots.

While operating costs were fairly similar for both practices over the three years, the increased seed yields from the stand with no companion crop resulted in higher net returns per acre. Of course, the extent of this advantage could be affected by changing prices on inputs and seed.

In a second demonstration started in the spring of 1981, Vista Alfalfa was seeded at 1¼ pounds per acre with and without a Flax companion crop.

The Flax yielded very poorly (5 bu/acre) due to injury from herbicides used to control broadleaf weeds, so provided little competition for the alfalfa.

TABLE 1 — Performance of Alfalfa Seed Plots Established With and Without A Companion Crop

Companion Crop	Establishment Year Yield (Seed or Forage)	Alfalfa Seed Yield	
		First Seed Year (lbs/acre)	Second Seed Year (lbs/acre)
Rapeseed	25 bus/acre	210	428
None	0.9 tons/acre*	308	472

*Hay crop cut in mid-August

TABLE 2 — Impact of Companion Crops on Alfalfa Seed Yields

Companion Crop	Yield Of Companion Crop kg/ha (bu/ac)	First Year Alfalfa Seed Yield kg/ha (lb/ac)
None	—	469 (418)
Flax	280 (4.5)	399 (356)
Wheat	2,200 (33)	336 (300)
Rapeseed	986 (17.6)	264 (236)
Barley	3,250 (60)	226 (202)

However, during the first year of seed production the alfalfa growth was still better and bloomed earlier where no companion crop was used. Seed yield was 238 kg/ha (212 lb/acre) on the companion crop plot and 312 kg/ha (278 lb/acre) on the plot where no companion was used. Even though the companion crop performed poorly, it still reduced alfalfa seed yield by 74 kg/ha (66 lb/acre).

In the third demonstration, Vista Alfalfa was used to assess the impact of various companion crops on first year alfalfa seed production. The Vista was seeded at 1¼ pounds per acre alone with wheat, barley, flax and rapeseed companion crops. Rapeseed was seeded at full recommended rate, the others at half the rate recommended in the Field Crop Recommendation for Manitoba.

Several herbicide treatments were applied to each plot to evaluate their effects on both the alfalfa and the companion crop. This led to severe weed problems in some areas . . . particularly rapeseed and flax where broadleaf weed control was poor.

The companion crops were harvested as grain and average yields per plot calculated. (See TABLE 2). Flax yields were severely reduced by weeds while the other companion crops produced average yields.

The following spring, alfalfa growth was best where flax and no companion crop had been used and was poor where barley and rapeseed had been used. Herbicides were used on all areas for weed control.

Once again, first year seed production was highest where no companion crop had been used. Flax and wheat companion crops had the least impact on production but still reduced alfalfa seed yields by up to 118 pounds per acre and rapeseed and barley companion crops cut first year alfalfa yields by 182 and 216 pounds per acre respectively!

Considering the extent of alfalfa seed yield losses that can be expected if a companion crop is used, projected costs and returns of each method should be calculated carefully before deciding to establish alfalfa with or without a nurse crop.

Fertility Requirements of Alfalfa Seed Fields

Since most research has concentrated on maximizing alfalfa's forage production, little information is available on the crop's specific fertility needs for seed production.

However, it appears that fertility requirements may be quite different for the two uses. For example, the lush growth sought in forage production makes it difficult for leafcutter bees to pollinate a seed stand properly.

Consequently, few alfalfa seed producers have considered fertility a major concern with common practice being to fertilize only when establishing a stand.

But, since certain nutrients are essential to many of the plant's functions — root development, winter hardiness, seed development and nitrogen fixation to name a few — it would be wise to ensure adequate levels of these minerals for established as well as seedling stands, pending more specific research.

Because alfalfa seed is small, nutrients should be placed where readily available to the plants shortly after emergences.

Fertilizing Seedling Stands:

Soil sampling is one of the first steps in establishing an alfalfa seed stand. It gives an inventory of the required nutrients available in the soil at the time of sampling.

The samples may be taken either in late fall or early spring before seeding, but fall is preferred because it gives more time to apply the recommended nutrients before spring seeding if required.

For full information on soil testing, see the Manitoba Agriculture Fact Sheet "Soil Testing Services In Manitoba".

Appropriate amounts of the recommended nutrients should then be applied in the most effective way. Because of alfalfa's small seed size, the nutrients should be placed to be readily available to the plants shortly after emergence. However, care should be taken to avoid seedling injury. For example, potassium and sulphur should be broadcast and incorporated prior to seeding since placement with the seed will cause seedling injury.

Most Manitoba soils are phosphorus deficient so phosphorus will likely be recommended. The best response to phosphorus is obtained by sidebanding 2 to 3 cms. below and 2 to 3 cms. to the side of the seed. Surface incorporation is adequate where sidebanding machinery is not available. However, producers have been drilling small amounts of phosphorus with the seed. But care should be taken. Rates over 25 kg/ha (25 lbs/ac) have caused seedling injury.

Inoculation of alfalfa seed is essential. This should be done just before seeding to provide the proper Rhizobium bacteria the plant needs for nodulation and nitrogen fixation. Alfalfa can only fix its own nitrogen when properly inoculated.

Various methods of inoculation are available but the most effective has been use of a "sticker" solution to dampen the seed prior to adding the inoculum.

For detailed information on inoculation, see Agriculture Canada's publication #1299, "Legume Inoculation" and Manitoba Agriculture's Fact Sheet "Legume Inoculation".

It should be noted that soil test recommendations may call for added nitrogen in the establishment year of an alfalfa stand, providing readily available nitrogen while the plants are nodulating.

Fertilizing Established Stands:

Nitrogen— There should be no need for nitrogen in established stands providing the seed was properly inoculated at planting. To check if adequate nitrogen fixation is taking place, dig sample plants from the soil carefully during periods of active growth. If nitrogen fixation is taking place, root nodules should be pink or red inside.

Nitrogen deficient plants will have yellow to yellowish green leaves.

Phosphorus — Large amounts of phosphorus are needed to develop adequate root systems, particularly for winter survival in seedling stands.

In established stands, phosphorus is responsible for developing the type of root system needed to maintain the large, branchy plants desired for seed production.

Phosphorus is also needed for seed development and severe deficiencies may limit yield potential.

Phosphorus deficient alfalfa plants have dark, bluish green leaves and may have short or stunted looking stems.

Potassium — The majority of Manitoba's soils contain enough available potassium for alfalfa seed production. However, coarse textured and sandy loam soils may require added potassium.

Potassium plays a major role in many physiological functions of alfalfa plants. It affects processes such as storage of food reserves, water uptake and development of cold hardiness in fall. Adequate supplies of available potassium reduce the incidence of winter injury.

Potassium deficiencies first appear as white spots around the edges of older leaves. Under severe deficiencies, size and frequency of the spots increases and in advanced cases, the leaf will completely yellow and die.

Sulphur — In Manitoba, sulphur deficiencies are most likely on well drained sandy soils and grey wooded soils. However, the deficiency is caused by leaching and therefore may occur in other soils as well. Soil tests are recommended to determine actual levels of available sulphur.

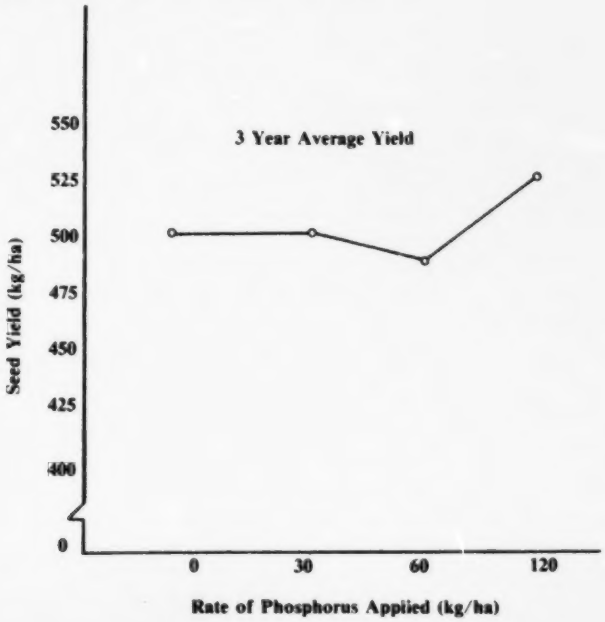
Alfalfa has a higher demand for sulphur than other crops. It is vital to production of plant protein and important in nitrogen fixation.

Sulphur deficiencies appear as stunted, spindly growth. Younger leaves may also be light green to yellow in colour.

Agro-Man Fertility Trial Results:

A demonstration designed to evaluate the effects of phosphorus fertilization on alfalfa seed production was conducted near Arborg.

FIGURE 1



Notice how much further advanced the innoculated alfalfa is. It is already well into bloom.

Preliminary soil tests indicated that the silty clay soil had very low levels (8 kg/ha) of available phosphorus and very high levels of potassium and sulphur.

Three levels of phosphorus were applied by broadcasting ammonium phosphate in the fall. Treatments were applied on the same plots for three consecutive years, beginning in fall, 1979.

Annual phosphorus applications of up to 120 kg/ha gave no significant yield response over the three year study. (See Figure 1).

At the 60 and 120 kg/ha rates, there was an increase in levels of available soil phosphorus over the three years, but it did not induce a yield response.

Tissue analysis showed adequate levels of phosphorus (0.27%) in plants taken from untreated plots even though soil levels were very low and the tissue levels did not increase when phosphorus was added to the soil.

Interestingly, seed production on the treated plots was equivalent to untreated plots even though there were fewer plants per acre. (The treated plots had 25,000 to 30,000 plants per acre while the untreated had 40,000 to 50,000 plants per acre). It appeared that plants in the treated plots were larger and bushier and so had greater seed production per plant. However, plant populations in both treated and untreated areas were in the ideal range of one plant per one or two square feet (5-10 plants/m^2).

Results of this demonstration suggest that the levels of phosphorus required for seed production may be considerably lower than for forage production. However, it should be stressed that these findings were very preliminary and, under different environmental conditions, alfalfa seed yield may show significant response to phosphorus application.

Insect Pest Identification and Control

Insect pests that attack the flowers and seed pods are one of the major problems of alfalfa seed production in Mantioba. They can completely destroy an alfalfa seed crop if not controlled.

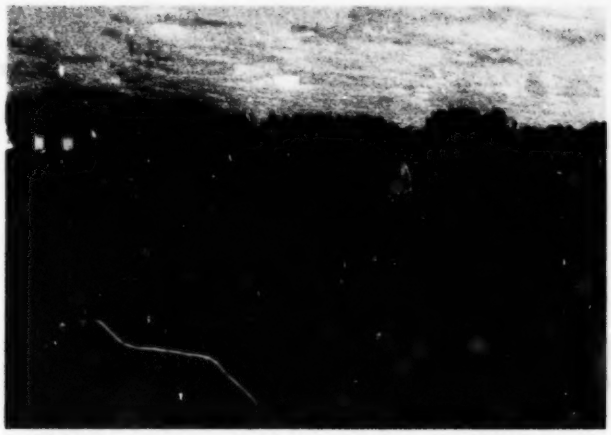
The two main pests are lygus bugs and alfalfa plant bugs. Pea aphids and grasshoppers can also reduce seed yields severely. Fortunately, alfalfa weevils, a serious problem in Alberta, have not been found in Manitoba seed fields.

Insect pest control starts with continuous field monitoring. The first samples and insect counts should be made during flower bud formation and should be repeated weekly throughout the season. If pest populations are high or steadily increasing, control is needed.

Often, the decision to spray is based on economic threshold populations. Specific thresholds of several important alfalfa seed pests are given in Table 3. Note that **as few as 2 of certain species can mean it's time to spray.**

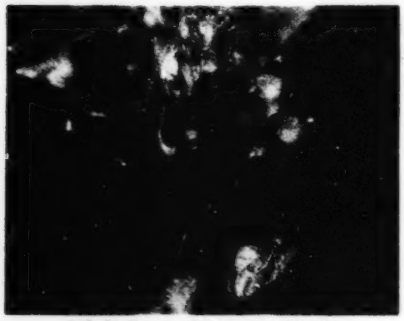
To ensure a representative sample and accurate pest counts, samples should be taken from every 5 to 10 acres in a field. Sampling one location in a field isn't good enough since insect populations can vary widely at different spots in the field.

A 39 cm. (15 in.) sweep net is used to collect the insects. To make a sweep, the net is held at arm's length to one side, lowered into the alfalfa and swept forcefully through the canopy in a 180° arc so insects are forced to the bottom of the net. About half of the net opening should be in the alfalfa. If the right amount of force is used, there will be pieces of plant material in the net with the insects.



Making a sweep to count insects. Net opening is well into alfalfa canopy and at arm's length from body.

Make a sweep, take one or two steps forward and repeat the procedure until five sweeps have been made. Now the insects are identified, counted and recorded and the entire procedure is repeated at several other locations in the field.



Adult lygus bug on alfalfa.

5th instar Lygus bug.

Description and Life Cycle of Major Insect Pests:

Lygus Bugs — Adult lygus bugs are 4-5 mm (¼ in.) long and 2-2.5 mm (⅛ in.) wide. Colour varies from pale green to reddish brown with a distinct, light coloured triangle plainly visible on the backs of the adults.

Lygus nymphs are smaller than aphids and resemble aphids but are more active. As they become older, five prominent black dots develop on their backs.

Lygus bugs overwinter as adults in headlands under debris, litter and plant cover. They become active in spring and lay eggs in alfalfa stems. After hatching, the nymphs go through 5 stages or instars in three to five weeks, with feeding activity increasing as they grow older. Fourth and fifth instars are distinguised from earlier stages by the presence of wing pads.

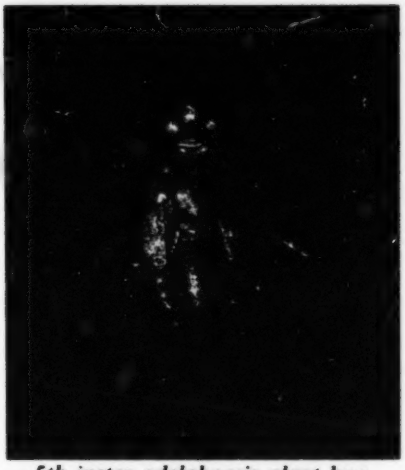
All stages of lygus bug feed on alfalfa by puncturing the plant tissue and sucking the juices. The greatest damage is caused by bugs feeding on the flower buds. This results in buds dying and dropping, a condition known as "bud blasting".

Older instars and adults will also feed on developing seeds. These seeds will be brown to black in colour, shrivelled and are usually lost during harvesting.

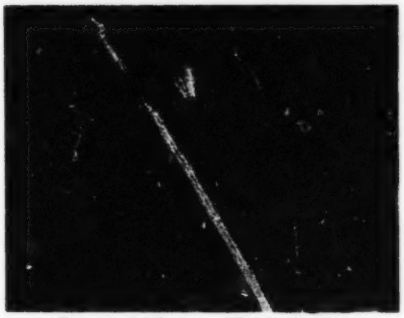
Nymph stages cause the greatest damage to alfalfa as they are more active feeders. However, high infestations of adults, especially after pod formation, can cause significant seed losses.

One adult per two sweeps in spring, 5 nymphs or a combination of 5 nymphs and adults later, is enough to warrant control measures.

Adult adelphocoris plant bug on alfalfa.



5th instar adelphocris plant bug.



Pea aphids on alfalfa leaf.

Adelphocoris Plant Bugs —Adult adelphocoris plant bugs are 8-9 mm (about ⅜ in) long and 2-2.5 mm (⅛ in.) wide. Notice they are about the same width as lygus bugs but about twice as long.

Adults are light yellow green to green in colour, with a light coloured triangular marking on the back. (similar to lygus)

Adelphocoris nymphs are green coloured, rather fast moving and somewhat pear shaped. They also have long, reddish brown antennae which are club shaped at the tips. This feature distinguishes them from aphids and lygus nymphs.

Adelphocoris plant bugs overwinter as eggs laid in alfalfa stems in late summer and early fall. The eggs hatch in May and June with the nymphs moulting five times before becoming adults in about five weeks.

Feeding habits are similar to lygus; they feed on buds, flowers, and developing seed resulting in bud blasting, flower drop and shrivelled seed.

No economic threshold has been established for adelphocoris adults but 5 nymphs per sweep - alone or with lygus nymphs - are serious enough to spray.

Pea Aphids — The adult pea aphid is about 3 mm (⅛ in.) long and 1.5 mm (1/32 in.) wide with a soft, pear shaped green body. Nymphs are similar to adults but smaller.

Pea aphids move slowly so are easily distinguished from lygus and adelphocoris plant bugs.

They overwinter as eggs attached to leaves and stems of host plants. In spring, the eggs hatch into wingless females which reproduce without mating. Some of the females from the resulting second and third generations are winged and migrate to other host plants. In fall, winged males and females are produced and mate, with the females laying eggs for next year's population.

Aphids suck the juices from alfalfa leaves, stems and flower buds. Unlike lygus and adelphocoris plant bugs, it takes very high populations of pea aphids to cause enough alfalfa damage to warrant control.

*Plant bug and pea aphid photos courtesy of H. Craig, Agriculture Canada, Saskatoon Research Station.

Grasshoppers — The three most common grasshoppers which infest alfalfa are the migratory grasshopper, the two-striped grasshopper and on occasion the clear-winged grasshopper.

Distinguishing between the three types is not really necessary since all can cause economic damage but for those who want to, migratory grasshoppers are greyish yellow to greyish brown in colour and about 23-24 mm (1-1⅜ in.) long. Two-striped grasshoppers are dark yellowish green with two yellow stripes from the head to the base of the wings. They are 26-40 mm (1-1½ in.) long. Clear winged grasshoppers are the smallest at 21-32 mm (⅞-1¼ in.) in length and are pale yellow brown to black in colour.

Grasshoppers overwinter as eggs laid in protective pods below the soil surface in late summer and early fall. Clear winged grasshoppers lay eggs along headlands, roadsides, fencelines and in pastures. The other species lay eggs throughout fields and in bare patches and ditch banks.

Eggs hatch in late spring and early summer. The newly hatched nymphs are wingless and quite small; about 4 mm (¼ in.) long. They moult five times before becoming winged adults in 5-8 weeks.

Grasshoppers can cause extensive damage to alfalfa seed fields since they are voracious eaters and will eat leaves, buds, flowers and seed pods. Infestations in late summer can completely destroy a seed crop by stripping off the seed pods. Field monitoring should continue throughout the season for grasshoppers as they may become a serious problem only after adjacent fields are cut for hay or grain. Two to three in a sweep is serious enough for control, with four or five in late summer capable of destroying the crop.

Insect Pest Control

Biological, cultural and chemical control methods, alone and in combination, can be used to control insect pests in alfalfa seed stands.

Natural insect predators are a good example of biological control. Ladybird beetles, damsel bugs, green lacewings, minute pirate bug and bigeyed bugs are some of the predators which feed mainly on aphids but, in some cases, on the nymphs of lygus and adelphocoris.

Good populations of natural predators can keep insect pests in check, eliminating the need for chemical control. The weekly insect sweeps will confirm whether or not this is happening.

Early spring burning of alfalfa stubble is a common cultural control practice. It destroys the eggs of adelphocoris plant bugs and any adult lygus present. However, more adult lygus will usually migrate into the field.

If burning is used, it should be done very early, before the alfalfa starts to grow or the plants may be injured and bloom delayed.

Most alfalfa seed producers rely on chemical control to handle their insect problems. Since most insecticides are hazardous to the pollinating insects, extreme care must be used to prevent unwanted injury during application. Timing is also critical since many insecticides have residual activity which can injure pollinators for several days after application.

Insecticides currently available for use in alfalfa seed stands include:

(a) **Dimethoate (Cygon)** —Apply 560 ml/ha (8 oz/ac) active for control of plant bugs, aphids and grasshoppers. **Should be applied 7 to 10 days prior to placement of leafcutter bees and before the field blooms** to prevent injury to other pollinators.

(b) **Dylox (Trichlorfon)** —Apply 560 ml/ha (8 oz/ac) active for control of lygus and adelphocoris plant bugs. Dylox can be used for pre-bloom control and also **can be applied for plant bug control in late evening when leafcutter bees aren't foraging.** Dylox will not control aphids or grasshoppers.

(c) **Supracide (Methidathion)** — Apply 280 to 560 ml/ha (4 to 8 oz/ac) active for control of lygus and adelphocoris plant bugs and aphids. Supracide should be used as a **pre-bloom treatment with a 10 day waiting period before release of leafcutter bees.**

Other insecticides, such as Furadan, may be used as pre-bloom treatments to control insect pests. Insecticide labels should be checked for correct rates and to ensure that the product will control the insect pest actually present.

For more information on insect control and toxicity of insecticides to bees, consult the Manitoba Agriculture Publication 'Control On Field Crops'.

TABLE 3 — Economic Thresholds of Insect Pests of Alfalfa Seed Production

Insect Pest	Threshold Limit (Number/Sweep)	Additional Information
Adelphocoris Adults	—	No threshold established. Adults in late June or July may result in a second generation.
Adelphocoris Nymphs	5	Alone or in combination with lygus nymphs.
Lygus Adults	0.5	This population of adults in the spring could produce an economic infestation of nymphs.
Lygus Nymphs	5	Alone or in combination with adelphocoris nymphs.
Pea Aphids	1000	About 200 aphids per plant would equal 1000 per sweep.
Grasshoppers	2 to 3	4 or 5 per sweep in late summer may completely destroy a seed crop.

Agro-Man Demonstrations Of Insect Pest Control

Several demonstrations were conducted to show the control results that could be expected from insect pest control products currently available. The results of the two major demonstrations are shown in Tables 4 and 5.

In the **first demonstration**, (Table 4), Dimethoate, Dylox and Decis were applied at recommended rates with the Dimethoate and Decis applications made two weeks prior to leafcutter bee release and Dylox applied the day before the release.

Decis is not currently registered for use on alfalfa but it has shown promise for grasshopper and plant bug control.

Although insect pest populations were below economic thresholds - only 32 aphids per sweep and 3.7

TABLE 4 — Control of Insect Pests in Alfalfa Seed Fields

Treatment	Rate (mln.i./ha)	Insects/Sweep		Seed Yield (kg/ha)
		Pea Aphids	Plant Bugs (Both Lygus & Adelphocorus)	
Dimethoate	560	4.3	1.6	287
Dylox	560	31.5	0.4	247
Decis	7	5.4	0.8	251
Check	—	32.3	3.7	201

bugs per sweep - and would not have warranted chemical control in a normal production situation, **all treatments still improved alfalfa yields by at least 40 kg/ha (35 lbs/ac)** over untreated checks.

One week after application, pest counts showed that Dimethoate had given good control of both aphids and plant buts while Dylox had controlled only plant bugs. Decis had results similar to Dimethoate.

TABLE 5 — Insect Pest Control Demonstration

Treatment	Rate (ml a.i./ha)	Insects/5 Sweeps					
		Adelphocoris Plant Bug			Pea Aphids		
		Days After Treatment					
		Prespray	6	28	Prespray	6	28
Dimethoate	560	3.8	1.2	4.2	62.0	10.0	60.8
Dylox	560	4.2	2.0	5.0	67.2	139.8	223.8
Decis	7	4.0	2.2	8.2	53.5	19.5	104.5
Check	—	3.5	2.8	12.8	53.0	96.8	247.0

The **second trial**, (Table 5), demonstrated the long term effects of insecticides on insect populations.

Dimethoate was applied 7 days before leafcutter bee release, Dylox and Decis the day after the bees were released. Treated areas were sampled for pests before treatment and 6 and 28 days after treatment. Initial populations of plant bugs and pea aphids were once again well below economic threshold limits and remained so throughout the trial even though they did increase past initial levels.

Six days after treatment, all insecticides had reduced adelphocoris population by 50%. However, 28 days after spraying plant bug populations were higher than before treatment even though they remained lower in the treated areas. At this point there were almost twice as many plant bugs in the Decis treated area than in the Dimethoate treated plot.

The steadily rising insect pest levels in this demonstration emphasized the importance of continuous field monitoring. Here, pest populations were below economic thresholds but in a commercial field where spraying was necessary, sampling only before and 6 days after treatment would have missed the continuing plant bug increase, from reproduction and migration.

Serious losses could have occurred before the producer realized there was a problem. Weekly checks would have spotted the increase in time for a follow-up treatment.

Bud "blasting" due to damage by lygus and adelphocoris plant bugs.

Dylox is the most versatile insecticide currently available to alfalfa seed growers. It can be used to control lygus and adelphocoris plant bugs at pre-bloom stage, or it can be applied in late evening when pollinators are not foraging, to control developing problems.

However, as the demonstration results in Tables 4 and 5 show, it does not control pea aphids. This is an excellent example of why producers must be able to correctly identify problem insects. If the "plant bug nymphs" are really aphids, applying Dylox would be a wrong answer.

Grasshoppers can occasionally become a real problem in alfalfa seed stands. They can completely destroy a seed crop by eating buds, flowers and seed pods. Fortunately, they usually tend to migrate into a seed stand only when nearby fields are cut for hay or grain. But if they reach critical levels during pollination, they have been almost impossible to control unless the pollinators are removed from the field. Dylox doesn't control them and insecticides that do, leave residues which injure leafcutter bees.

Bran baits, although not yet registered, have been very effective in controling grasshoppers with little effect on pollinators.

An Agro-Man demonstration was carried out to evaluate the effectiveness of bran baits for grasshopper control. Initial field samples gave a grasshopper population of 13 per sweep, much higher than the economic threshold of 2 to 3 per sweep.

The bait, flaky wheat bran treated with Dimethoate at 14g/kg (½ oz per pound) of bran, was applied at 11 kg/ha (10 lbs/ac) with forced air fertilizer applicator. The rate of bran may be reduced to about 4.5 kg/ha (4 lbs/ac) but a higher rate was used here because of the severe infestation.

Results of the bran bait were very impressive with over a 70% kill even though rain washed the bran to the ground within 12 hours of application.

The potential is promising and may alleviate problems associated with grasshoppers migrating into alfalfa fields in late season.

Note: Always use proper safety equipment and procedures when handling chemicals. The health you save could be your own!

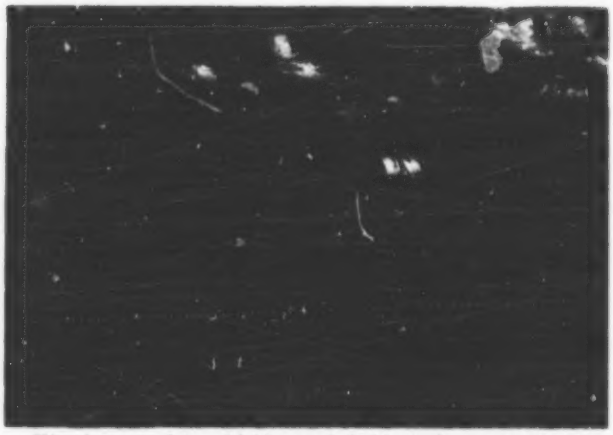
Weed Control in Alfalfa Seed Fields

Good weed control is essential for economic production of alfalfa seed. Perennial weeds such as Canada Thistle, Perennial Sow Thistle and Quackgrass are most troublesome since they are difficult and costly to eradicate in a stand. They should be eliminated before a stand is established.

Annual weeds are not as serious but must be controlled since they compete vigorously with alfalfa seedlings during establishment and can cause reduced seed yields and contaminated seed in production years.

Alfalfa seed producers are often tempted to use unregistered herbicides to control problem weeds. This is understandable but extreme caution should be used. Lack of registration may be due to insufficient information of effects on alfalfa or even more serious reasons. The chemical may cause too much injury to alfalfa; it could leave residues in the plant tissue and basically, if it's not registered, any residue is illegal; or results with the herbicide may be too variable to predict effects.

Producers are advised to consult Manitoba Agriculture's Guide to Chemical Weed Control for the latest recommendations on herbicides registered for use on alfalfa seed stands.



Weed control in alfalfa seed fields ***before*** *establishing alfalfa!*

Weed Control in Seedling Stands:

Annual weeds are the greatest threat to seedling alfalfa. Dense infestations may kill the alfalfa outright. Lighter infestations can severely damage the stand through competition, reducing the alfalfa growth and leaving small weak plants.

Even in apparently clean fields, herbicides are often necessary.

Companion crops complicate weed control in seedling alfalfa. The list of suitable herbicides is shortened because two crops, instead of one, must be considered.

Generally, the best weed control is achieved when alfalfa is seeded alone.

Listed below are a number of herbicides which are recommended for use on seedling alfalfa in Manitoba or which have **potential uses***. The herbicides are divided into groups according to whether the alfalfa is seeded alone, with wheat, barley, flax or rapeseed and, within those groupings, according to whether they are registered or have **potential***. If a product is listed under more than one heading, a reference to its first mention is included.

*The statement That A Herbicide Shows Potential On Alfalfa Is **Not A Recommendation To Use That Product!**

Some of the weeds controlled are listed with each herbicide. Rates are expressed in product per hectare unless otherwise noted. Herbicide labels should be consulted carefully for additional information on use.

A. Alfalfa Seeded Alone:

Eptam 8-E, Eptam 10G — Controls wild oats, green and yellow foxtail, barnyard grass and several broadleaf weeds including lambs quarters and red root pigweed.

Apply at 4.25 l/ha or 34 kg/ha granular product and incorporate immediately with disc implements or cultivators set to cut to a depth of 10 to 15 cm (4-6 in).

Asulox F — Controls wild oats and suppresses green and yellow foxtail, barnyard grass and several broadleaf weeds including wild buckwheat and wild mustard.

Apply at 2.75 l/ha when wild oats are in the 2 to 4 leaf stage. **Do not graze or feed to livestock during the treatment year.**

Carbyne 2EC — Controls wild oats when applied at 1.25 to 1.75 l/ha.

Apply when the majority of wild oats are in the 2 leaf stage. Since seedling alfalfa is not a strong competitor, Carbyne will not be as effective with alfalfa as with other crops.

Dalapon and Similar Products — Controls green and yellow foxtail and barnyard grass when applied at 2.25 to 3.25 kg/ha.

Apply when grasses are small and alfalfa is 5 to 8 cm (2-3 in) tall. **Do not feed first year cuttings to dairy animals or to animals being finished for slaughter.**

Embutox E and Similar Products — Controls several broadleaf weeds including wild mustard and lambs quarters. Will provide some top growth suppression of Canada thistle and perennial sow thistle.

Apply at 3.0 to 3.5 l/ha when the alfalfa is in the first to third trifoliate leaf stage. Narrow leaved hawk's beard can also be controlled with a fall application of Embutox E at 3.5 l/ha **after legume growth stops.**

Fusilade — Controls most annual grassy weeds when applied at 0.8 to 1.4 l/ha. Some growth of quackgrass is suppressed at this rate, but higher rates (2 to 4 l/ha) are required for an effective job. **Do not feed or graze in the treatment year.**

Hoe Grass — Controls wild oats, green and yellow foxtail and barnyard grass when applied at 2.5 l/ha.

Apply at 1 to 4 leaf stage of grasses, before they tiller. Herbicides for broadleaf weed control must be applied at least four days after Hoe Grass. **Do not feed or graze in the treatment year.**

Mataven — Controls wild oats when applied at 5 l/ha.

Apply when wild oats are in the 3 to 6 leaf stage. **Do not feed or graze in the treatment year.**

Non-Registered Herbicides:

Avadex, BW, Avadex BW Granular — Controls wild oats when applied at 4.25 l/ha or at 17.5 kg/ha of the granular formulation. Granular is more suitable for fall application or trashy conditions, liquid for spring application.

Must be incorporated to a depth of 5 cm (2 in) twice before seeding.

Treflan EC — Controls wild oats, green and yellow foxtail and several broadleaf weeds including wild buckwheat, lambs quarters, and red root pigweed. Recommended rates vary with soil type, time of application and the weed problem. (Consult the herbicide label and Manitoba Agriculture's Guide to Chemical Weed Control for further information).

Treflan must be incorporated to a depth of 7.5 to 10 cm (3-4 in) twice prior to seeding alfalfa. Alfalfa has shown good tolerance to Treflan.

Basagran — Controls several broadleaf weeds including lambs quarters wild mustard and red root pigweed when applied at 1.75 l/ha. **Alfalfa leaves may whiten after application and there is some stunting of the plants.**

Lexone DF, Sencor 500 — Controls several broadleaf weeds including lambs quarters, wild mustard and smartweed when applied at 275 g/ha for Lexone DF, 425 ml/ha for Lexone L or 425 ml/ha of Sencor 500.

Alfalfa seedlings may whiten after treatment resulting in some plant stunting.

Pardner, Torch — Controls several broadleaf weeds including wild buckwheat, cow cockle, wild mustard and lambs quarters. Apply at 1.25 l/ha before weeds are past the 6 leaf stage. **Leaf burn on alfalfa will result in stunting of plant growth.**

Poast — Controls most annual grassy weeds when applied at 0.8 to 1.9 l/ha. At higher rates (2.75 l/ha) quackgrass growth may be suppressed. **Alfalfa has shown good tolerance to Poast.**

B. **Alfalfa With Wheat Companion Crop:**

Avadex BW, Avadex BW Granular — Recommended for use. See Section A, above. Apply at reduced rate of 3.5 l/ha or 15 kg/ha granular product in spring **after seeding the wheat but before seeding the alfalfa.**

Avenge 200 C — Controls wild oats when applied at 3.5 to 4.25 l/ha. Use the higher rate of heavy wild oat infestations. **Apply only to Neepawa, Glenlea, Selkirk, Chester, Macoun, Canuck or Benito** wheats. Apply when wild oats are in the 3 to 5 leaf stage. Allow 4 days between application of Avenge and broadleaf control herbicides. **Do not graze or feed to livestock.**

Carbyne 2EC — Recommended for use. See Section A above. Carbyne 2EC works better with a cover crop than without.

Embutox E and Similar Products — Recommended for use. See Section A above.

Hoe Grass — Recommended for use. See Section A.

Mataven — Recommended for use. See Section A.

MCPA Amine, Potassium Salt, Sodium, 2,4-D Amine — While these products are registered for use on alfalfa with a cereal companion crop. **They are not recommended, as serious alfalfa damage may result.**

Non-Registered Herbicides:

Treflan EC—Recommended on wheat. Apply at 1.1 to 1.5 l/ha after seeding but prior to crop emergence. **Incorporate twice** with tyne or diamond harrows as soon as possible after application **(within 8 hours).** Apply only to a trash free surface. Wheat must be seeded to a depth of 5 to 7.5 cm (2-3 in). See Section A above.

Lexone DF, Sencor 500—Recommended for use on wheat. Consult Section A above.

Pardner, Torch—Recommended for use on wheat. See Section A above.

C. **Alfalfa With Barley Companion Crop:**

Avadex BW — Recommended for use. See Section A above.

Avenge 200C — Recommended for use. See Section A above.

Carbyne 2EC — Recommended for use. See Section A above.

Embutox E and Similar Products — Recommended. See Section A.

Hoe Grass — Recommended for use on some barley varieties. **Do not apply to Klages, Betzes, Norbert or Glenn Barley.** See Section A.

MCPA Amine — Registered for use. **Not recommended.** See Section B.

Non-Registered Herbicides:

Treflan EC — Recommended for use on barley. Apply at 1.1 to 1.5 l/ha after seeding but prior to emergence. Apply to trash free surface. Barley must be seeded to a depth of 5 to 7.5 cm (2 to 3 in). Incorporate twice with tyne or diamond type harrows as soon as possible after application (within 8 hours). See Section A.

Lexone DF, Sencor 500 — Recommended for use on barley. See Section A.

Pardner, Torch — Recommended for use on barley. See Section A.

D. **Alfalfa With Flax Companion Crop**

Avadex BX, Avadex BW Granular — Recommended for use. See Section A.

Eptam 8-E, Eptam 10-G — Registered for use on both crops. See Section A.

Asulox F — Recommended. See Section A and Section B.

Dalapon and Similar Products — Apply at 1.1 to 1.75 kg/ha when flax is to 10 to 15 cm (4-6 in) tall. **Rates are lower than when alfalfa is seeded alone.**

Fusilade — Registered for use on both crops. See Section A.

Hoe Grass — Recommended. See Section A.

MCPA Sodium Salt — Controls several broadleaf weeds when applied at 0.36 to 0.42 kg/ha active. Apply when alfalfa is in the first to third trifoliate leaf stage.

Non-Registered Herbicides:

Treflan EC, Treflan QR5 — Recommended as a fall application before seeding flax. Apply at 2.0 to 3.0 l/ha or 28 to 34 kg/ha granular. Both incorporations must be done in the fall. The seedbed should be shallow tilled in spring. Seed into a moist seedbed, no more than 4.0 cm (1.5 in) deep, using only a press drill or hoe drill. **Do not seed in early May when soil conditions are cold and not conducive to rapid emergence.** See Section A.

Basagran — Recommended on flax. See Section A.

Pardner, Torch — Recommended on flax. See Section A.

Poast — Recommended on flax. See Section A.

E. **Alfalfa With Rapeseed Companion Crop:**

Avadex BW, Avadex BW Granular — Recommended on both crops see Section A.

Carbyne 2EC—Recommended on both crops. See Section A.

Dalapon and Similar Products—Recommended on both crops. See Section D.

Hoe Grass—Recommended on both crops. See Section A.

Non-Registered Herbicides:

Treflan EC, Treflan QR5 — Recommended on rapeseed. See Section A.

Fusilade — Not registered for use on rapeseed but rapeseed has shown good tolerance. See Section A.

Poast — Recommended on rapeseed. See Section A.

Note: Control of broadleaf weeds is very difficult when alfalfa is established with a rapeseed cover crop. For example, Treflan will control some broadleaf weeds, but is not registered for use on alfalfa.

If producers choose to establish alfalfa with rapeseed, they should be very aware and choose only fields where there is no history of major broadleaf infestations.

Weed Control in Established Alfalfa Stands

Annual weeds aren't normally a serious problem in established alfalfa stands since the alfalfa starts growing early in the spring and crowds out most annuals.

However, thin stands and wide row spacings give annual weeds a chance to flourish and become a problem. Generally the first year of seed production is when annuals are most serious, particularly if the stand has been weakened by a companion crop.

Biennial and perennial weeds are the most serious in established alfalfa. Quackgrass, Canada thistle, sow thistle, sweet clover, bladder campion, American dragonhead and narrow leaved hawk's beard are among the major problems. All can spread very quickly without control.

Very few herbicides are registered for use on established alfalfa seed fields and those that are control mainly broadleaf weeds so it is important **to eradicate perennials before establishing alfalfa.**

Hand rogueing is an effective, if time consuming, method of eradicating small numbers of perennial weeds. Controlling weeds along field borders and margins is also important to keep perennial weeds from invading seed fields.

Broadleaf Weed Control in Established Alfalfa

Herbicides registered for broadleaf weed control in established alfalfa are listed below. Rates are for product per hectare unless otherwise noted. Consult the product label and Manitoba Agriculture's Guide to Chemical Weed Control for more complete information on product use.

Princep Nine-T — Controls seedlings of several broadleaf weeds including wild buckwheat, hemp-nettle, lambs quarters and wild mustard. Apply at 1.1 kg/ha before freeze-up in fall. Moisture is required to move the chemical into the soil where it is absorbed by the roots of susceptible seedlings.

Sinbar — Controls seedlings of several broadleaf weeds including wild buckwheat, wild mustard, red root pigweed and smartweed. Apply at 0.7 to 1.5 kg/ha after the alfalfa is dormant in fall or before new growth starts in spring. There may be some suppression of quackgrass and dandelions, but results are variable. Moisture is needed to move the herbicide into the soil. **Do not plant treated areas to any crop within two years of application or crop injury may result.**

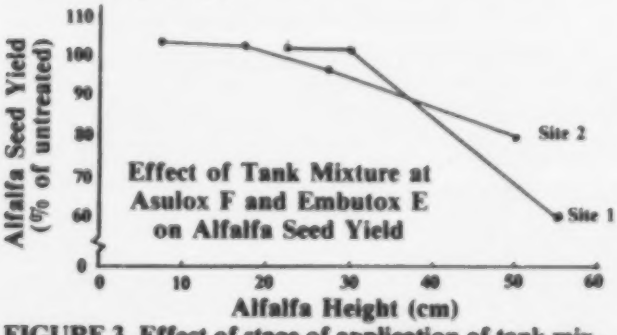


FIGURE 3. Effect of stage of application of tank mixture of Asulox F (2.75 l/ha) and Embutox E (1.5 L/ha) on alfalfa seed yield.

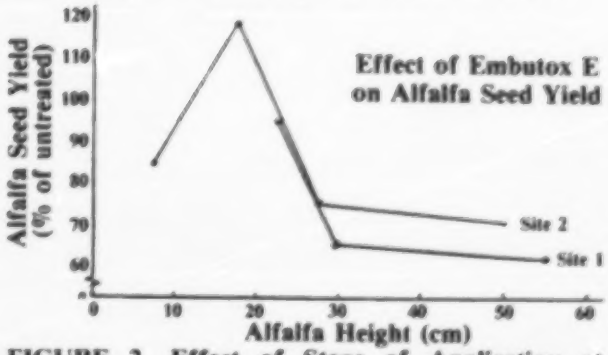


FIGURE 2. Effect of Stage of Application at Embutox E at 3 l/ha on Alfalfa Seed Yield.

Asulox F — Supresses several broadleaf weeds including wild buckwheat, wild mustard and smartweed when applied at 2.75 l/ha. **Do not feed or graze during treatment year.**

Asulox F plus Embutox E — Controls several broadleaf weeds including wild buckwheat, wild mustard and smartweed. Apply 2.75 l/ha Asulox F tank mixed with Embutox E at 1.5 l/ha before alfalfa reaches 15 cm (6 in.) in height. **If alfalfa is under stress when sprayed, bloom may be delayed. Do not graze or feed in treatment year.**

2,4-D — Controls several broadleaf weeds when **applied at 0.7 kg/ha** active. **Will cause injury** to alfalfa and should only be **used for spot treatments. Overall applications will delay bloom.**

NOTE: Embutox E tank mixed with Asulox F is recommended for broadleaf weed control in established alfalfa but **Embutox E by itself is not due to alfalfa injury.** Injury symptoms include twisting of stems, delayed blooming and aborted blossoms. Injury is most likely under stress conditions such as heat. Injury is less likely if the alfalfa is actively growing. Timing of application also influences the degree of damage.

Demonstrations evaluating the effect of stage of application have shown that once plants were taller than 25 cm (10 in.), seed yield decreased. (See Figure 2.) Therefore, delaying application to achieve better suppression of Canada thistle actually causes greater injury to the alfalfa stand.

Early applications can also cause seed yield reductions. At one location, (Figure 2, Site 2) applications at only 5 to 10 cm (2 to 4 in.), resulted in a 15% seed loss. Cool temperatures and poor soil moisture resulted in slow alfalfa growth and resulting Embutox E injury.

Producers must be aware of these losses if they are going to continue to use Embutox E by itself.

The tank mix of Embutox E/Asulox F is now recommended for use on alfalfa seed stands in Manitoba. Its two main advantages are that the rate of Embutox E is reduced by 50% without losing broadleaf control and the Asulox F controls wild oats and suppresses green and yellow foxtail.

Demonstrations showed no yield reductions on alfalfa seed if applied before the alfalfa reached 30 cm (12 in.). (See Figure 3.) Later applications did reduce seed yields.

Current recommendations are to apply before alfalfa reaches 15 cm (6 in.).

Grassy Weed Control in Established Alfalfa

Quackgrass is the most troublesome perennial weed in alfalfa seed stands. It can completely infest a stand in just two or three years.

It starts growing about the same time as alfalfa in the spring and competes strongly throughout the seed production season. Creeping rootstocks and seed spread during harvesting let it spread rapidly through thin seed stands.After seed harvest, it has time to become stronger and spread even further before freeze-up.

Two grassy weed herbicides have had considerable effect on quackgrass without damage to alfalfa. They are Fusilade, licensed for use on several broadleaf crops including seedling and established alfalfa; and Poast, registered for use on several broadleaf crops including rapeseed **but not including alfalfa.** Most research with these two chemicals has centred on annual grassy weed control but **recent field trials have shown that at higher rates (Fusilade 2.0 l/ha and Poast 2.7 l/ha), they will provide season long suppression* of quackgrass when applied at the 3 to 5 leaf stage.** However, annual applications are necessary to keep the quackgrass in check since it will begin to regrow by early fall.

Fusilade applied at 2.0 l/ha for two consecutive seasons reduced quackgrass infestations by 30% to 50%. (See Tables 6 and 7.) Poast had little if any effect on density but season long suppression by either treatment gave substantial seed yield increases in heavily infested fields. Higher, but costly, rates of either Poast or Fusilade gave even better quackgrass control.

This picture shows the dramatic effects of controlling quackgrass with Fusilade or Poast. Note the untreated areas.

Four new grassy weed herbicides were evaluated at two different rates over two years in another demonstration. (See Table 8.)

Fusilade at 2.0 l/ha suppressed the quackgrass, reduced infestation and greatly improved alfalfa seed yields. At 1.0 l/ha, Fusilade suppressed quackgrass growth in both years and improved seed yield.

Poast at 1.4 l/ha did not suppress the quackgrass adequately. At 2.7 l/ha it provided good suppression through most of the growing season but didn't affect density the following year.

Dowco 453, currently being tested for use on broadleaf crops, appeared to have the best activity on quackgrass. Quackgrass infestation was greatly reduced after a single ap-

TABLE 6. Suppression of Quackgrass with Annual Applications of Poast and Fusilade.

Treatment[a]	Applied Rate (l/ha)	Quackgrass[b] Density colms/m^2	Alfalfa Seed Yield 1981 — (kg/ha) —	1982
Poast	2.7	762	838	548
Poast	5.4	616	824	682
Poast	8.1	424	759	684
Fusilade	2.0	470	867	594
Fusilade	4.0	316	828	740
Fusilade	6.0	316	836	772
Check	—	746	449	342

[a] Treatments were applied in May of 1981 and 1982 when the quackgrass was at the 3 to 5 leaf stage.

[b] Quackgrass densities were determined in May, 1983 after two annual applications of each treatment.

TABLE 7: Suppression of Quackgrass with Annual Applications of Poast and Fusilade

Treatment[a]	Applied Rate (l/ha)	Quackgrass[b] Density (colms/m^2)	Alfalfa Seed Yield 1981	1982 (kg/ha)	1983
Poast	2.7	708	780	272	329
Poast	5.4	495	883	320	397
Poast	8.1	460	870	275	452
Fusilade	2.0	512	842	371	438
Fusilade	4.0	324	984	343	412
Fusilade	6.0	300	969	350	475
Check	—	1032	686	221	247

[a] Each treatment was applied to the same area in May of 1981, 1982, and 1983 when the quackgrass was in the 3 to 5 leaf stage.

[b] Quackgrass densities were determined in May, 1983 prior to the final herbicide treatments.

TABLE 8. Effects of Several New Grassy Weed Herbicides on Quackgrass in Established Alfalfa

Treatment[a]	Applied Rate (l/ha)	Quackgrass[b] Density (colms/m^2)	Alfalfa Seed Yield 1982 — (kg/ha) —	1983
Poast	1.4	478	454	158
Poast	2.7	474	479	165
Fusilade	1.0	514	582	226
Fusilade	2.0	440	706	290
Dowco 453	1.0	318	699	224
Dowco 453	2.0	238	777	305
HOE 00736	1.4	442	504	271
HOE 00736	2.8	470	521	292
Check	—	546	377	141

[a] Each treatment was applied to the same area in May of 1982 and 1983 when the quackgrass was in the 3 to 5 leaf stage.

[b] Quackgrass densities were determined in May, 1983 prior to the final herbicide treatment.

plication at either rate and seed yield response was very good.

HOE 00736, another new herbicide, provided very good quackgrass suppression but didn't appear to reduce the infestation very much the year after application.

Manitoba alfalfa seed producers are enthusiastic about the advances in quackgrass control, readily adopting chemical control measures and looking forward to further research and registrations since quackgrass has been a major restriction to economic seed production.

Following are the herbicides that are registered for grassy weed control in established alfalfa seed fields. Rates are expressed as product per hectare. Herbicide labels and Manitoba Agriculture's "Guide to Chemical Weed Control" should be consulted for further information.

Kerb 50-W — Controls foxtail barley when applied at 0.9 to 1.1 kg/ha. Should be applied between October 1 and freeze-up. Higher rates will control other grassy weeds.

Princep Nine-T — Controls barnyard grass and green and yellow foxtail when applied at 1.1 kg/ha. Apply in fall, prior to freeze-up.

Sinbar — Controls most annual grassy weeds. Apply at 0.7 to 1.5 kg/ha after alfalfa goes dormant in the fall or in early spring before new growth starts. Some suppression of quackgrass may occur. **Note: Do not plant any crop in treated area within two years of application or crop injury may result.**

Asulox F — Controls wild oats and suppresses green and yellow foxtail and barnyard grass. Apply at 2.75 l/ha when wild oats are in the 2 to 4 leaf stage. **If tank mixed with Embutox E, application must be made before alfalfa reaches 15 cm (6 in.) in height. Do not graze or feed livestock during treatment year.**

Carbyne 2EC — Controls wild oats. Apply at 1.25 to 1.75 l/ha when the majority of wild oats are in the 2 leaf stage.

Fusilade — Controls most annual grasses when applied at 0.8 to 1.4 l/ha. Seasonal control (suppression*) can be expected when Fusilade is applied at 2 to 4 l/ha.

*** Growth is suppressed only . . . quackgrass is not killed.**

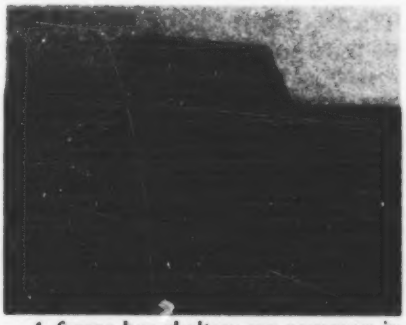
Canada Thistle, Sweet Clover, Bladder Campion

These three perennial weeds are major concerns for alfalfa seed producers.

Currently, the only guaranteed solution to Canada thistle and sweet clover is to avoid fields where they are present and to try to hand rogue them as they appear.

Applications of Embutox E at 3.0 l/ha may suppress their top growth, but control is inadequate because of rapid regrowth.

With the advent of rope wick applicators, roller applicators and back pack sprayers, several seed producers have tried to control Canada thistle and sweet clover with Round-up.



A-frame bee shelters are common in the eastern part of Manitoba. A standard shelter is shown in the upper photo.

Association members tour a quackgrass control demonstration.

With wick or roller type applicators, Round-up is mixed at one part product to two parts water and applied as needed. This technique is beneficial where the problem is patchy and doesn't yet dominate the field.

Hand held wick applicators appear better than roller applicators for this purpose as they are easy to handle and can be used discriminately. With roller applicators it is often difficult to get the necessary height difference between the alfalfa and the weed.

A one or two percent Round-up solution applied with a back pack sprayer can also be effective for patch control of Canada thistle. Time and labour are the major restrictions to all of these control methods.

Bladder campion is a major concern since it is a primary noxious weed under the Canada Seeds Act and none of its seed is allowed in foundation, certified or Canada No. 1 alfalfa seed.

The only control measures for bladder campion are intensive summerfallow for at least two years or application of Tordon 22K by a licensed applicator. Unfortunately, both have limitations. With summerfallow, reinfestation can occur because of seed limitations. With summerfallow, reinfestation can occur because of seed reservoirs in the soil. With Tordon 22K treatment, residues can persist in the soil for up to five years and alfalfa is very sensitive to this herbicide.

Bladder campion seed can be cleaned from alfalfa seed if a plant can be found that is willing to do the job. However, the process results in considerable alfalfa seed losses and leaves the major problems of disposing of screenings and cleaning equipment.

Every alfalfa seed producer should become familiar with this weed and be able to identify it at least tentatively. More importantly, every alfalfa grower . . . whatever the end product . . . should use only Canada No. 1, certified or foundation seed to guarantee bladder campion won't be introduced through seed.

More information on bladder campion is available from Manitoba Agriculture offices across the province.